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Science is a pillar of modern democracies

Healthy democracies support the well-being of their citizens through policies based on objective facts and analyses.

Science is the method of inquiry that aims precisely at objectivity. It does this by collecting and analyzing data in a manner that is as free as possible from personal or ideological biases or other conflicts of interest.

The process of peer review is the enforcer of this objectivity. The vast majority of scientific studies are critically reviewed by other experts in their research field at an international level. To reduce the possibility of favoritism or coercion, the authors of the study are generally not aware of who their reviewers are. Additionally, conflict-of-interest disclosures are mandated for most journal publications as well as federal grant applications.

What is scientific consensus?

Scientific consensus emerges when the available data, state-of-the-art methods, and the majority of studies on a research topic, often numbering in the thousands and conducted over decades globally, point to similar findings and conclusions.

Uncertainty, debate among experts, and constant re-evaluation of theories with new data or methods of analysis all lie on the road to these consensus. In fact, they are essential to the practice of science. All modern scientists are skeptical by nature, or at least should be by training. This is not a shortcoming of science. It is its strength.

It is this fluid, self-critical process that makes scientific consensus our best unbiased attempt at understanding what are often very complex phenomena. As a medical researcher since the 1980's, I can say that this is very much the case for science on public health and environmental issues facing our nation.

How is scientific consensus sometimes ignored or misrepresented when forming public policy?

I have been greatly concerned during my career when the scientific consensus appears to be ignored or subverted by political and/or financial interests during the formation or enforcement of government policies on public health and the environment issues.

These influences are sometimes brought to bear via administrative appointees to oversight agencies or advisory committees. At times, appointees not only disagree

with the scientific consensus but promote minority if not marginal opinions that are more favorable to an industrial or financial interest. Such appointees may misrepresent the 'doubt' or 'division' within a scientific community on an issue, ignoring the true large degree of agreement.

The most outstanding example of this today is certainly the issue of climate change. A climate change "skeptic," Andrew Wheeler, was appointed to head the Environmental Protection Agency during the past administration. Wheeler, who had worked as a lobbyist for the coal industry, oversaw the scaling back of CO2 and air pollution regulations in the country, even though over 97% of published climate scientists agree that fossil fuel emissions are a major cause of climate change (Cook et al, 2013) and several thousands of studies in the last few decades have demonstrated their toxicity. Fine particulate matter alone is a cause of tens of thousands of premature deaths in the US yearly (Vorha et al, 2021).

How can we guarantee that scientific consensus is always considered in policy making?

The question of how to insure that the scientific consensus always plays a dominant role in health and environmental policy formation, or at least is represented accurately, is obviously a difficult one. Outside the national laboratories, hospitals and health institutes, appointees are generally not scientists or physicians, and sometimes not even true "experts" on topics overseen by the agencies.

It would be hard to imagine that a supreme court justice could be appointed without having a law degree or judicial experience. But, in a sense, this is very similar to appointing a lawyer and coal lobbyist, with no scientific or "environment protection" experience, to head the EPA.

Ideally, appointees to lead agencies that rely heavily on science like the EPA would be vetted for their expertise relevant to the agency, just as judicial appointees are, as well as any conflict of interests (e.g., anti-science positions or strong financial ties to industries the agency regulates). However, this may not be practical without procedural changes in how federal agency appointees are approved by the Senate.

If the scientific expertise and integrity of the agency head cannot be vetted and ensured, then its scientific and technical employees should be granted the power and, in fact, encouraged to exercise their own integrity. For example, if a worker publically disagrees with a policy change on scientific grounds, their job should not be put in jeopardy.

Among other measures, this might come in the form of existing federal whistleblower protection, along with adequate training to be aware that such protection exists and how to exercise one's rights within an agency to speak on issues of scientific accuracy.

Such measures might also include procedures to present a formal evidence-based challenge to a particular policy or policy change within an agency, which might be elevated to the Office of Science and Technology Policy for review and possible action. Experts in the field from the national laboratories and institutes might serve as ad hoc reviewers of the scientific issues disputed.

Given the current divisive political climate in our country, this will obviously be a very challenging problem to solve. Ironically, it is science itself that is often at the center of the divisiveness, with disinformation about the scientific consensus fueling public doubt and influencing policymaking on issues ranging from climate change to air and water pollution to the current deadly pandemic.

This targeted disinformation, or perhaps often simply a lack of understanding about the science, impede taking effective action to combat these very real threats to the sustainability of our nation.

I therefore urge the Office of Science and Technology Policy (OSTP) to undertake the task of strengthening our scientific integrity policies across federal agencies with ample input from government scientists and administrators and other agency members. Paramount among the steps taken should be to insure that real experts in the appropriate fields of science can be heard within the agencies and are not muted out of fear of administrative reprisal.

References:

Cook et al., Quantifying the Consensus on Anthropogenic Global Warming in the Scientific Literature, Environmental Research Letters, Volume 8, Number 2, 2013.

Vorha, et al, Global mortality from outdoor fine particle pollution generated by fossil fuel combustion: Results from GEOS-Chem, Environ Res. 2021 Apr;195.